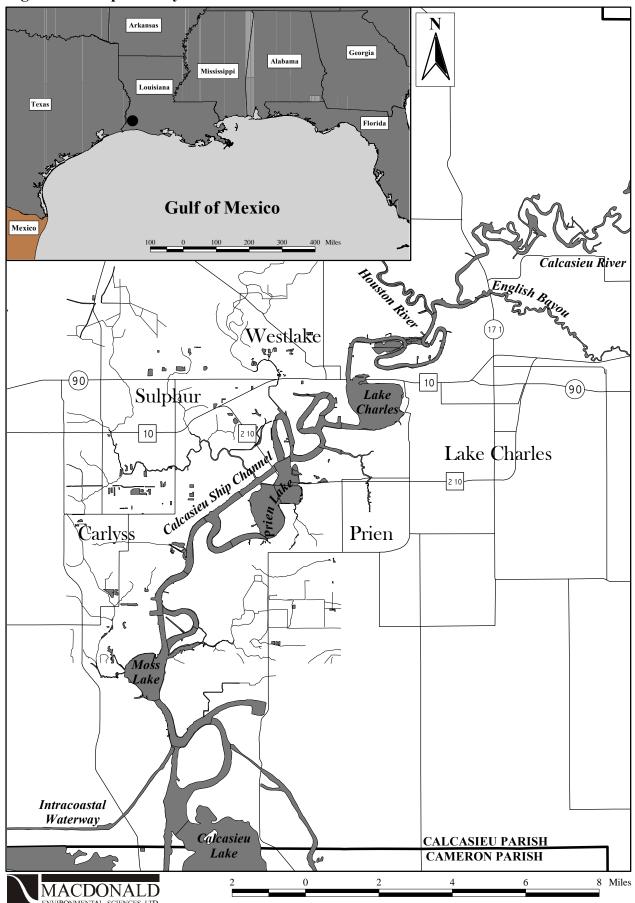
Figures

Figure 1.1 Map of study area.



Saltwater Barrier (378) Opper Calcasieu River 10 **Lake Charles** Contraband Bayou Calcasieu Ship C **Highway 210 Bridge** 2 10 Legend Streams Highways Water courses Confined Disposal Facilities Wetlands 2.5 Miles 0.5 **MACDONALD**

Figure 2.1 Map of the upper Calcasieu River and associated water courses.

Figure 2.2 Map of Bayou d'Inde and associated wetland areas. Sulphur Coon Island Loop PRG Canal Lockport Marsh Highway 210 Bridge Bayou d'Inde Calcusien Ship Channel Prien Lake Legend Streams 'Highways Water courses Confined Disposal Facilities Wetlands 1.5 Miles

Figure 2.3 Map of the middle Calcasieu River and associated water courses. BE ou d'Inde Highway 210 Bridge Prien Lake Calcasien River Indian Wells Lagoon Legend Streams Highways Water courses Confined Disposal Facilities Moss Lake Wetlands 1.5 Miles

Figure 2.4 Map of the lower Calcasieu Estuary, including the areas selected to represent reference conditions. & Moss Lake Payou Choupique Ellender Intracoastal Waterway Black Lake Bayou Bois Sabine Lake Connine Calcasieu Lake Grand Bayou Willow Bayou Johnson Bayou Legend Streams Gulf of Mexico Highways Water courses 12 Miles

Figure 3.1 Map of study area showing major discharging facilities (USEPA 2000a). Houston River Westlake CONDEA VISTA CO. CONOCO INC. OLIN CORP. Sulphur PPG ★ Lake **INDUSTRIES ÎNC** Charles Lake Calcasien Ship Channel WESTLAKE
POLYMERS CORP. City of Lake <u>Ch</u>arles Charles WWTP City of Sulphur WWTP **OXYCHEM** (Equistar) Prien WESTLAKE / PETROCHEMICALS FIRESTONE SYNTHETIC RUBBER & LATEX CO. Carlyss CITGO PETROLEUM CORP. WESTLAKE STYRENE CORP. W. R. GRACE WESTLAKE STYRENE CORP. Moss Lake Legend **Industrial Facilities Public Facilities** Streams Highways Water Courses 8 Miles MACDONALD

Figure 3.2. Map showing the contaminants of potential concern identified for each reach within the Calcasieu Estuary area of interest.

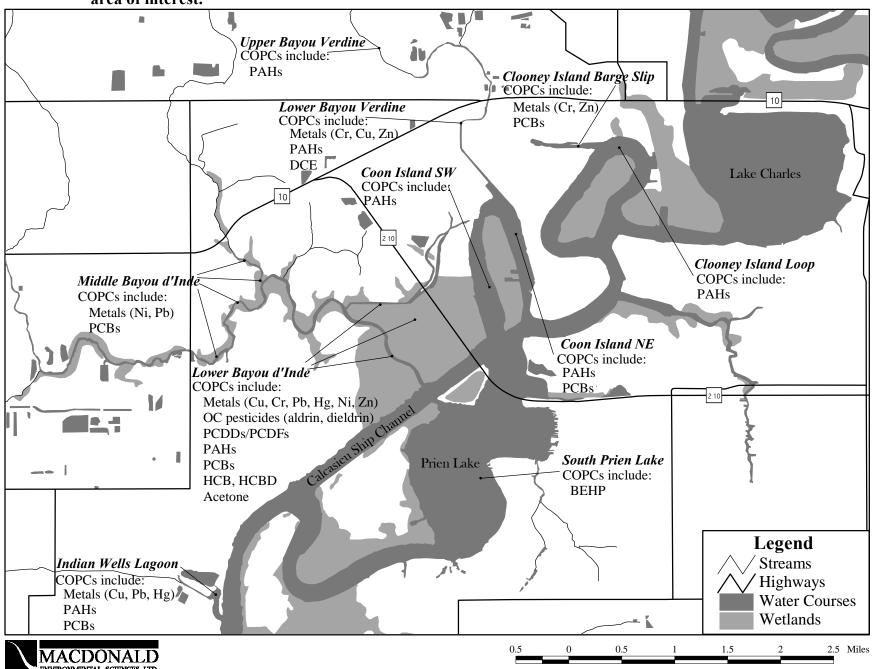
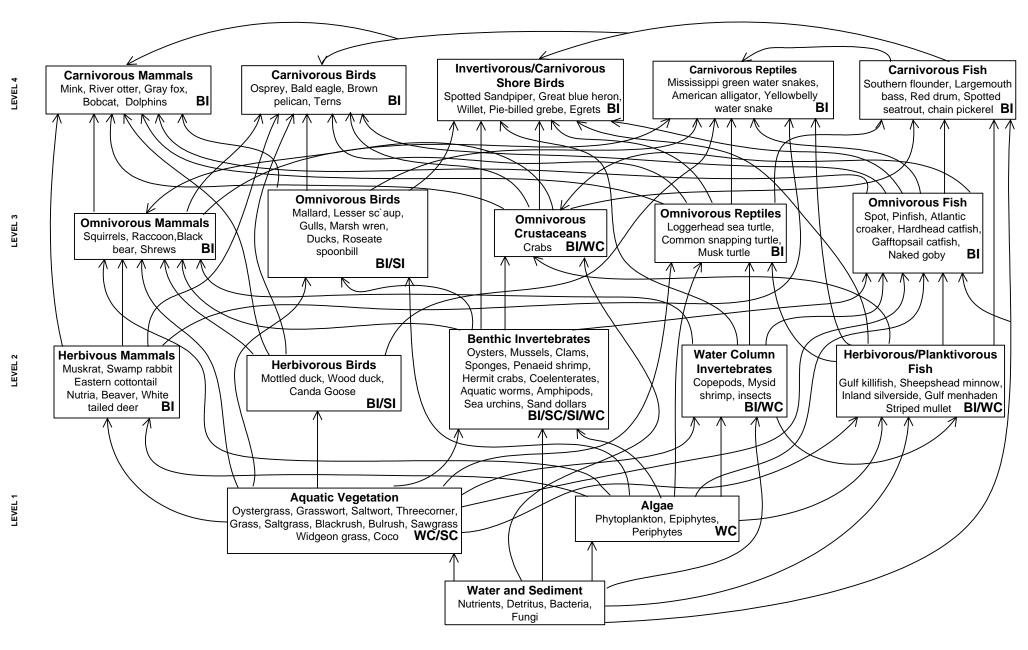


Figure 7.1 An example Gulf Coast estuarine food web (adapted from TNRCC 2000).



Principal Exposure Routes: BI = Biota Ingestion; WC = Water Contact; WI = Water Ingestion; SC = Sediment Contact; SI = Sediment Ingestion

^{*} Insectivorous mammals (bats, nine-banded armadillo) and insectivorous/carnivorous amphibians (toads, frogs, salamanders) are components of the Calcasieu Estuary foodweb that do not appear in this diagram. These groups represent relatively minor components of the overall foodweb and were excluded for the purpose of simplifying the diagram.

Reptiles Carnivorus Wading Birds Piscivorus Birds **Carnivorous Fish** Level 4 Osprey, Kingfisher, Pelicans, Mississippi Green Water **Piscivorus Mammals** Great Blue Heron, Great Egret, Redfish, Black Drum, Spotted Mink, River Otter, Dolphins Snowy Egret Terns Snake, American Alligator, Seatrout, Gar, Chain Pickerel ΒI BI/IH BI/IH Yellowbelly Water Snake BI/WC BI/SC **Omnivorous Fish Amphibians Sediment-probing Birds** Level 3 Spot, Pinfish, Atlantic croaker, **Omnivorus Mammals** Bull Frog, Leopard Frogs, **Insectivorous Birds** Roseate Spoonbill, Willet, Hardhead catfish, Gafftopsail catfish, Toads, Salamanders Raccoon, Black Bear Purple Martin, Swallows Stilts, Ibis, Ducks Naked goby BI/SC/WC BIBIBI/SI/IH BI/SI/WC **Benthic Invertebrates** Herbivorous/Planktivorous Fish **Aquatic Invertebrates** Oysters, Mussels, Clams, Sponges, Copepods, Mysid Shrimp, Gulf Killifish, Sheepshead Minnow, Level 2 Penaeid Shrimp, Blue Crabs, Inland Silverside, Gulf Menhaden, Crabs, Emergent Insects, Bivalves, Aquatic Worms, Water Striders Striped Mullet Amphipods, Sea Urchins, Other Crabs BI/WC BI/WC BI/SC/SI/WC Level 1 **Aquatic Plants Decomposers** Algae (periphyton, phytoplankton), Macrophytes Bacteria, Fungi, Protozoa WC/SC SC/WC Water and Sediment Nutrients, Detritus

Figure 7.2 The Calcasieu Estuary food web showing the principal routes of exposure to contaminated water, sediment and biota.

Principal Exposure Routes: BI = Biota Ingestion; WC = Water Contact; SC = Sediment Contact; SI = Sediment Ingestion; IH = Inhalation (Note: surface waters tend to have high salinity, reducing the potential for water ingestion by ecological receptors).

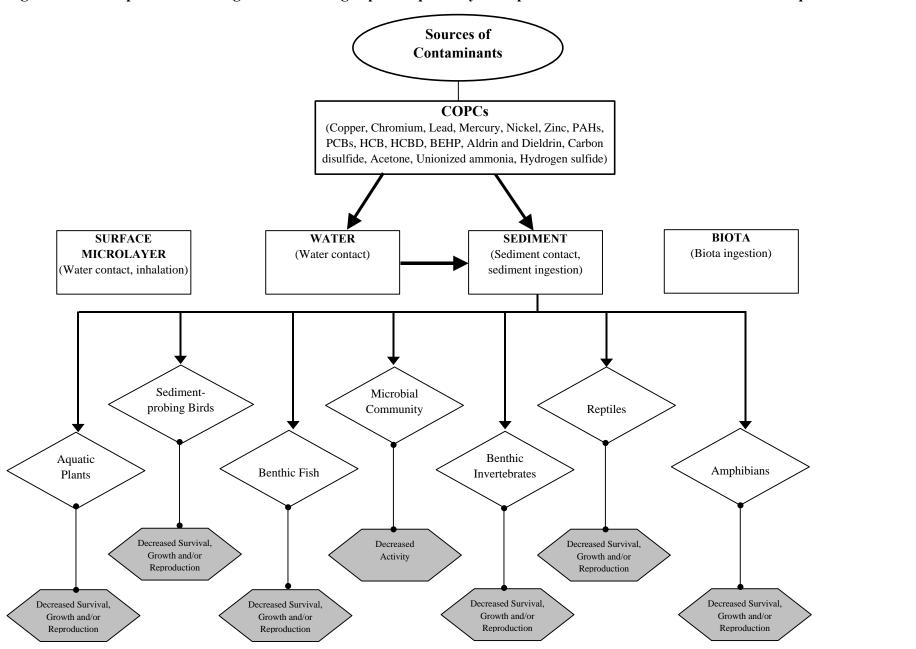
Figure 7.3. Conceptual model diagram illustrating exposure pathways and potential effects for bioaccumulative substances. Sources of **Contaminants COPCs** (Mercury, PAHs, PCBs, PCDDs, PCDFs, Hexachlorobenzene, Hexachlorobutadiene, Aldrin, Dieldrin) **Environmental Fate** SURFACE BIOTA WATER SEDIMENT MICROLAYER (Biota ingestion) (Water contact) (Sediment contact, (Water contact, inhalation) sediment ingestion) Carnivorus Piscivorus Piscivorus Carnivorus Wading Birds Mammals Birds Reptiles Fish Receptors Sediment-Benthic Insectivorus Omnivorous probing Birds Invertebrates Amphibians Birds Mammals Decreased Survival, Decreased Survival, Decreased Survival, Decreased Survival, Decreased Survival, **Risk Hypotheses** Growth and/or Growth and/or Growth and/or Growth and/or Growth and/or Reproduction Reproduction Reproduction Reproduction Reproduction

Decreased Survival,

Growth and/or

Reproduction

Figure 7.4 Conceptual model diagram illustrating exposure pathways and potential effects for toxic substances that partition into sediments.

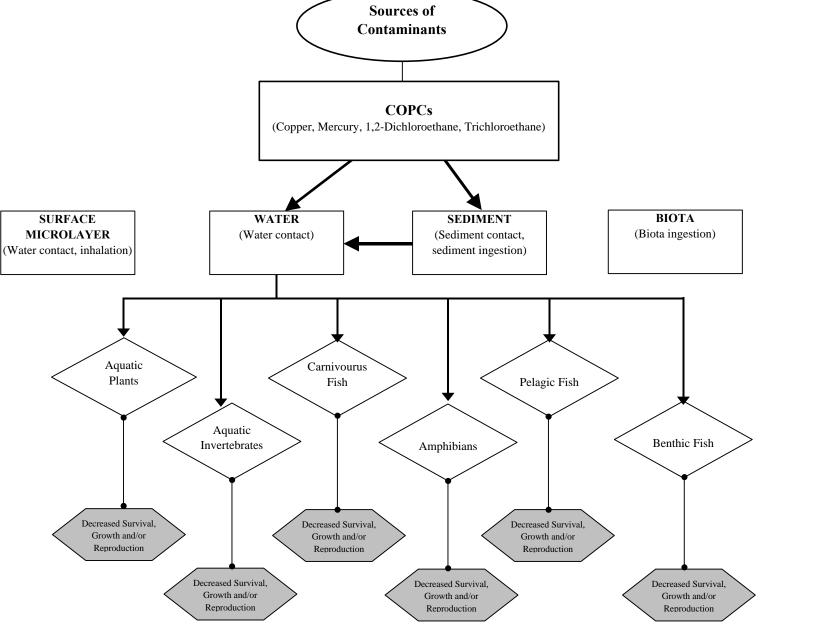


Risk Hypotheses

Environmental Fate

Figure 7.5 Conceptual model diagram illustrating exposure pathways and potential effects for toxic substances that partition into overlying water.

Sources of Contaminants



Risk Hypotheses

Environmental Fate

Receptors

Figure 7.6 Conceptual model diagram illustrating exposure pathways and potential effects for toxic substances that partition into the surface microlayer.

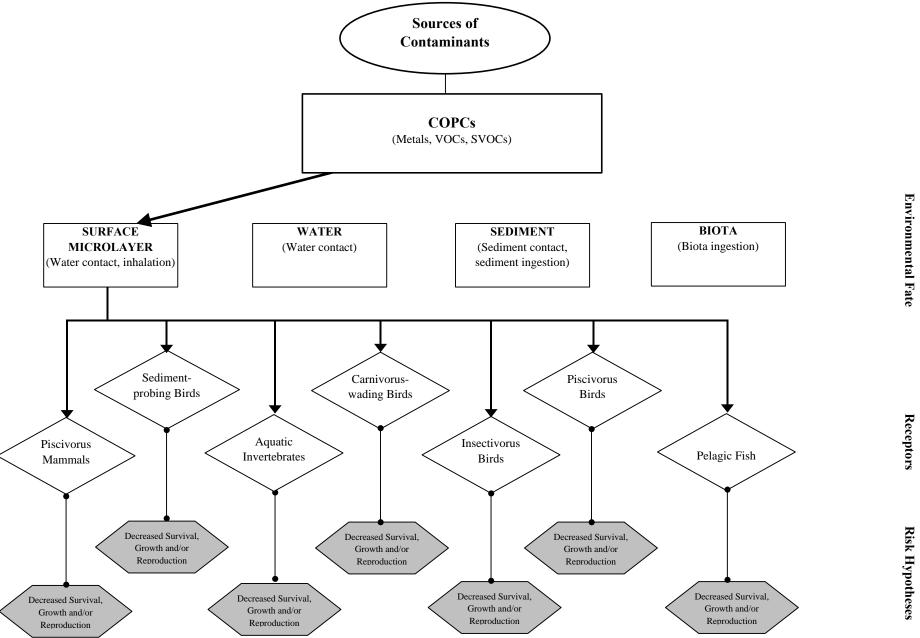


Figure 7.7 Conceptual model diagram illustrating exposure pathways and potential effects for all categories of COPCs.

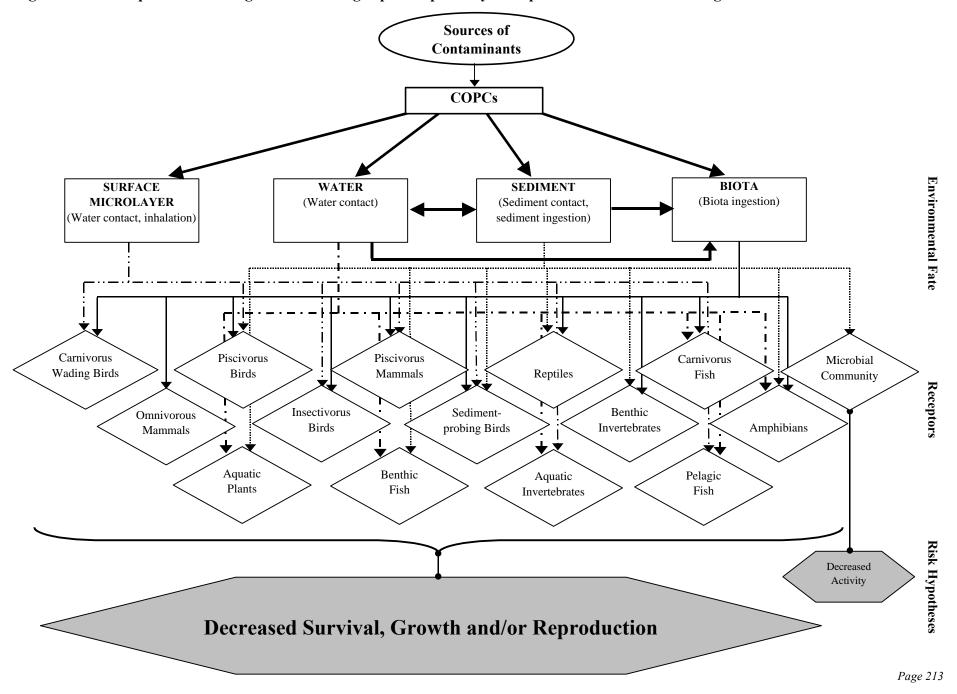


Figure 9.1. General mechanics of a probabilistic risk analysis. Following selection of the measure of risk and the equation that will estimate risk, probability density functions (PDFs) are specified for each input variable. The input PDFs are combined as specified in the risk equation and the output generated by means of a Monte Carlo simulation or other method. The resulting risk estimate is then carefully examined (e.g., by means of a sensitivity analysis) and the analysis fine tuned by adjusting the input PDFs or risk equation as necessary. Upon completion of the analysis, the results are summarized, generally in the form of a probability density function (as in figure) or a cumulative probability distribution.

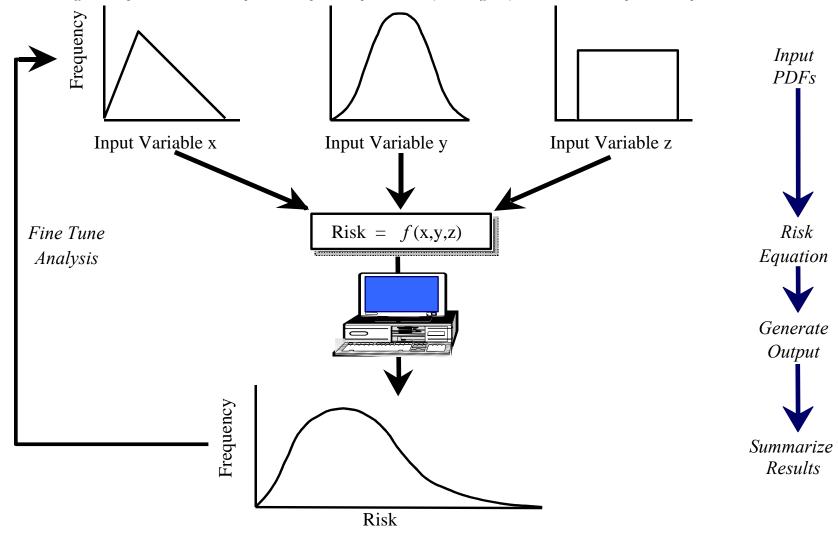


Figure 9.2. Use of 2nd order Monte Carlo approach to distinguish between variability and incertitude for mathematical expressions involving constants and random variables. Five hypothetical values or distributions from the outer loop simulation are shown for the inputs and output. For the well characterized input constants and random variables, the values and distributions, respectively, do not change from one outer loop simulation to the next.

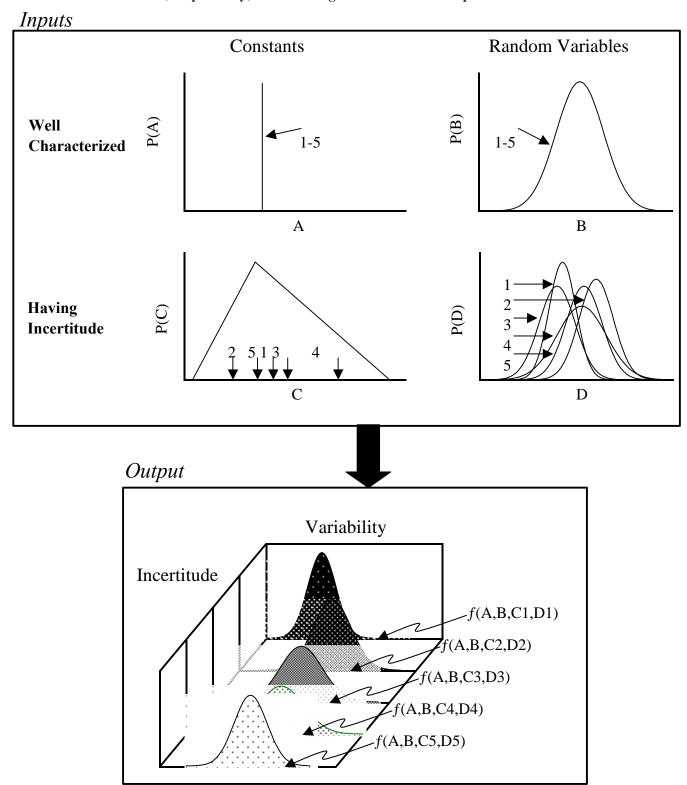


Figure 9.3. An example showing how exposure and effects distributions are combined to generate a risk curve (see Moore *et al.* 1999b for more detail). (A) Cumulative density function for female mink exposed to methylmercury near East Fork Poplar Creek, Tennessee. (B) Concentration-response curve with 95% fiducial limits for effects of dietary methylmercury on survival of female mink during chronic exposures (circles indicate original data). (C) Estimated dose-response curve. (D) Risk curve for female mink exposed to methylmercury.

